impact at relatively modest cost. Ames is already leading this effort for NGST. Reliable closed-cycle cryogenic coolers must also be developed to cool these detectors to temperatures of 4 to 30 kelvin above absolute zero. This task will be eased by the fact that the NGST telescope will always be behind a sun shade and will cool down to approximately 40 kelvin. However, these and all other NGST systems must be very reliable because NGST will be located approximately a million miles from Earth, far beyond the reach of the Space Shuttle, and will not be serviceable by astronauts.

Point of Contact: T. Greene
(650) 604-5520
tgreene@mail.arc.nasa.gov

The SOFIA Telescope Assembly Alignment Simulator

Michael R. Haas, David S. Black, Jeffrey C. Blair, Paul A. Cardinale, Nghia N. Mai, Michael S. Mak, John A. Marmie, Michael J. McIntyre, David D. Squires, Eric Stokely, Ka-cheung Tsui, Bryant C. Yount

The NASA Stratospheric Observatory for Infrared Astronomy (SOFIA) is scheduled to begin routine flight operations from Ames in early 2003. To facilitate installation and integration of science instruments with the observatory, a Telescope Assembly Alignment Simulator (TAAS) is being designed and built. Such a facility is required because of the high flight rate, frequent instrument change-outs, and limited access to the telescope cavity.

The TAAS will be an essential part of the Preflight Integration Facility in the SOFIA Science and Mission Operations Center. Before an instrument flies on SOFIA, it will first be mounted on the TAAS to: (a) conform all mechanical and electrical interfaces; (b) prepare the instrument for flight and assess its operational readiness; (c) optically align the instrument with respect to the telescope; and (d) measure the weight and moments of the instrument for use in balancing the telescope assembly. Because the TAAS has such a fundamental role in the preparation of science instruments for flight, a second unit will be permanently stationed in the Southern Hemisphere for use during deployments.

Figure 1 shows an advanced design for the main mechanical structure of the TAAS. Science instruments mount on the instrument-mounting flange, and their associated electronics are housed in a rack attached to the counterweight plate. In order to provide an accurate mechanical reproduction of the telescope interface, the flange assembly and counterweight plate will be exact duplicates of those on SOFIA. The bearing unit assembly allows the science equipment to be rotated through the full range of elevation angles appropriate for SOFIA. The drive system powers the rotation and maintains a selected elevation angle. Three different infrared light sources have been designed to mount on the rear of the TAAS, for use in instrument alignments. A bore-sight camera assembly will be located in the horizontal tube of the TAAS; it will record focus and bore-sight information and facilitate its transfer to the telescope.

Patch panels that are identical to those on the aircraft will be mounted on the sides of the counterweight rack. Through these panels, the instrument will be connected to all essential services, such as vacuum and gas lines, electrical power, and computer communications, to allow a full operational evaluation of the system. The communications will include connection to the computer simulator of the observatory for protocol evaluation and testing of critical software interfaces.

The TAAS is mounted on load cells so that it can measure the weight and moments of instrument focal-plane packages. These measurements will be used to infer the distribution of counterweights required to balance the SOFIA telescope about all three rotational axes for the given instrument configuration. With this information, the balancing procedure aboard the observatory should take less than an hour.

Preliminary design concepts have been developed for all TAAS subsystems, culminating in a successful preliminary design review in September 1999. Some critical subsystems have been prototyped in the laboratory, including the load cells and a special-purpose controller that modulates the signals from the alignment sources.

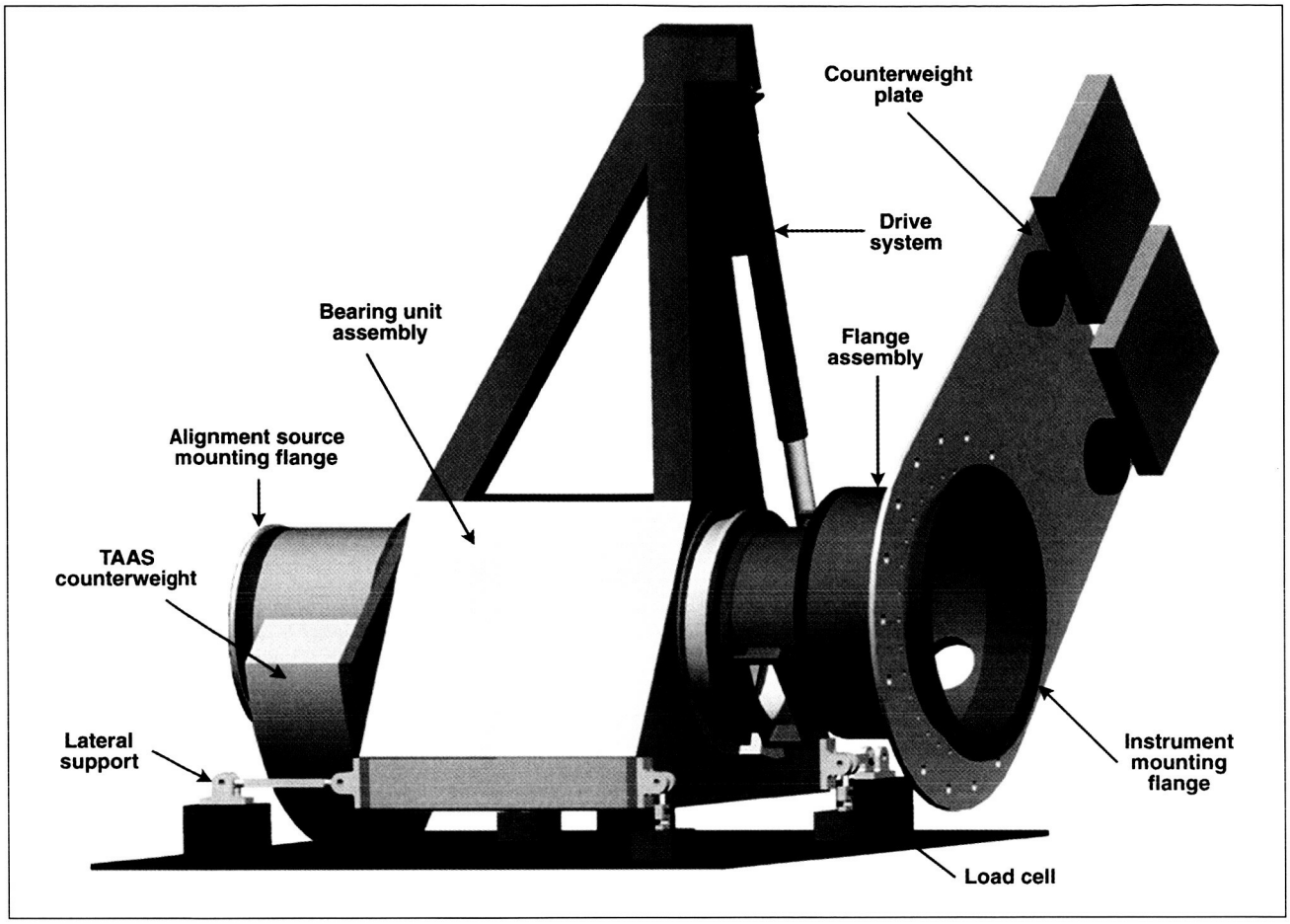

Fig. 1. An advanced design for the Telescope Assembly Alignment Simulator.

Point of Contact: M. Haas
(650) 604-5511
haas@cygnus.arc.nasa.gov

The Center for Star Formation Studies

D. Hollenbach, K. R. Bell, P. Cassen, G. Laughlin

The Center for Star Formation Studies is a consortium of scientists from the Space Science Division at Ames and the Astronomy Departments of the University of California at Berkeley and Santa Cruz. Under the directorship of D. Hollenbach, this consortium conducts a coordinated program of theoretical research on star and planet formation and supports postdoctoral fellows, senior visitors, and students. Consortium members meet regularly at Ames to exchange ideas and present informal seminars on current research; a week-long workshop on selected aspects of star and planet formation occurs each summer.

In July 1999 the Ames members of the Center together with members of the Stratospheric Observatory for Infrared Astronomy (SOFIA) team held an international workshop entitled "SOFIA and Star Formation." Held on the University of California at Santa Cruz campus, the week-long workshop had approximately 175 attendees. One purpose of this workshop was to bring theoretical and observational astronomers together with the instrumentalists